

P2 Manuals

The U.S. Environmental Protection Agency (EPA) has published two P2 manuals prior to the publication of this Guide. Both of these publications are available on this CD-ROM. In addition, a link is provided to an electronic version of this EPA manual. A number of other excellent P2 manuals and sample P2 plans are also available to help guide an organization that seeks to follow Chapter 8 in the Guide and prepare its own unique P2 program.

[Back HOME](#)

[Prev. Released EPA Manuals](#)

[Other P2 Manuals](#)

[Sample P2 Plans](#)

[Training](#)

[Elec. Version of this Guide](#)

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet <u>1</u> of <u>8</u> Page <u> </u> of <u> </u>

WORKSHEET

7a

PROCESS INFORMATION

Worksheet 7 contains sections on the following industrial processes that generate hazardous waste:

Machining Operations

Metal Parts Cleaning & Stripping

Metal Surface Treatment & Plating Operations

Paint Application

Other: _____

Complete the appropriate sections of this worksheet that correspond to processes practiced in your plant.

1. MACHINING OPERATIONS

Complete for each machine:

Description of machine: _____

Identification number: _____

Type of metal working fluid used: _____

Actual water-to-fluid ratio used: _____

Size of sump: _____

Frequency of sump cleanout: _____

Is manual or hand-piped fluid addition employed? _____

How often is the machine inspected for:

hydraulic and lubrication oil leakage? _____

sump and fluid condition? _____

fluid leakage or spillage? _____

What is the reason why the machine's fluid is dumped? _____

What fluid cleaning/filtering devices are used? _____

Process Information:

How is metal working fluid removed from machines? _____

Where is it taken? _____

How often are fluid storage areas inspected for spills and leaks. _____

Quantity of fluid used per week: _____

per year: _____

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet <u>2</u> of <u>8</u> Page ____ of ____

WORKSHEET
7b

PROCESS INFORMATION

(continued)

1. MACHINING OPERATIONS (continued)

List types and amounts of fluids used:

Type of Fluid

Annual Amount

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Cost of waste fluid disposal: _____

Cost of virgin fluid: _____

Current waste management techniques: _____

Waste Minimization Opportunities: _____

Potential waste minimization savings of input materials and waste management costs: _____

Comments: _____

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet <u>3</u> of <u>8</u> Page ____ of ____

WORKSHEET
7c

PROCESS INFORMATION

(continued)

2. METAL PARTS CLEANING AND STRIPPING

Solvent Cleaning Techniques:

Are solvents used for cleaning purposes? _____

If so, which of the following are employed?

- | | |
|---|--|
| <input type="checkbox"/> Vapor Degreaser | <input type="checkbox"/> Rag Wipedown |
| <input type="checkbox"/> Spray Chamber | <input type="checkbox"/> Brush Scrubbing |
| <input type="checkbox"/> Covered Solvent Cold Cleaning Tank | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Uncovered Solvent Cold Cleaning Tank | |

<u>Solvent Chemical</u>	<u>Technique (include number & sizes)</u>	<u>Annual Usage</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

How are spent solvents managed?

- | | |
|---|---|
| <input type="checkbox"/> Biodegradable; dispose of in sewer | <input type="checkbox"/> Treated or incinerated onsite |
| <input type="checkbox"/> Recycled onsite | <input type="checkbox"/> Treated or incinerated offsite |
| <input type="checkbox"/> Recycled offsite | <input type="checkbox"/> Other _____ |

Annual Costs: _____

For onsite recycling, is residue hazardous? _____

How are used rags disposed of? _____

Annual Costs: _____

Aqueous Chemical Cleaning Techniques:

What cleansers, strippers, surfactants and detergents are used in the plant?

Types of aqueous cleaners used: _____

<u>Chemical Description</u>	<u>Active Ingredient</u>
<input type="checkbox"/> Alkaline surfactant cleaner	_____
<input type="checkbox"/> Alkaline detergent cleaner	_____
<input type="checkbox"/> Alkaline stripper	_____
<input type="checkbox"/> Acid cleanser	_____
<input type="checkbox"/> Acid stripper	_____

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet <u>4</u> of <u>8</u> Page ____ of ____

WORKSHEET

7d

PROCESS INFORMATION

(continued)

2. METAL PARTS CLEANING AND STRIPPING (continued)

Process Techniques:

- | | |
|---|--|
| <input type="checkbox"/> Spray chamber
<input type="checkbox"/> Air-sparged bath
<input type="checkbox"/> Agitated bath | <input type="checkbox"/> Sink
<input type="checkbox"/> Rag wiping
<input type="checkbox"/> Brush |
|---|--|

Type of Aqueous Cleaner

Technique (include sizes and number)

Annual Usage

How are spent cleaners managed:

- ☐ Biodegradable; disposed of in sewer
☐ Transported offsite
☐ Treated onsite

Annual Costs: _____

Abrasive Cleaning and Stripping

Annual Costs: _____

Describe abrasive cleaning and stripping techniques used (e.g., blasting boxes, buffing machines, etc.)

How are wastes from abrasives techniques managed (e.g., dust, worn discs, etc.) _____

Annual Costs: _____

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet <u>5</u> of <u>8</u> Page <u> </u> of <u> </u>

WORKSHEET
7e

PROCESS INFORMATION

(continued)

2. METAL PARTS CLEANING AND STRIPPING (continued)

Water Cleaning

Annual Costs: _____

<u>Size of Rinse Bath</u>	<u>Application¹</u>	<u>Continuous or Still Rinse²</u>	<u>Temp.</u>	<u>Annual Usage</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Are spray rinse techniques used within the plants? _____

Describe spray rinse operations: _____

Is the spray rinsing done in combination with or instead of immersion rinsing? _____

Are spent still rinses used as makeups for the process baths? _____

Is the counter-current rinsing employed at the plant? _____

Describe how it is used (Give the number of tanks in each counter-current series, the flow rates and the process chemicals rinsed from the workpieces.): _____

Water use rate for entire plant rinsing operations: _____

Is deionized water or reverse-osmosis filtered water used for rinsing/cleaning? Where? _____

Is air sparging or mechanical agitation used in the rinse baths? _____

List which technique is used in which bath: _____

- 1 (Le., What process solutions are rinsed from workpieces by the bath?)
2 (Give flow rate for continuous baths.)

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet 6 of 8 Page ____ of ____

WORKSHEET

7f

PROCESS INFORMATION

(continued)

2. METAL PARTS CLEANING AND STRIPPING (continued)

Is the spent water recycled or reclaimed? _____

☐ settled

☐ filtered

☐ chemically classified

Is the spent water treated onsite? _____

Is the recycling or treatment residue hazardous? _____

If yes, how is it managed? _____

Waste minimization opportunities in metal parts cleaning and stripping: _____

Potential waste minimization savings of process materials and waste management costs: _____

Comments: _____

3. METAL SURFACE TREATMENT AND PLATING OPERATIONS

Complete a worksheet for each process tank.

Description of tank's function: _____

Identification number: _____

Size: _____

Composition of process solution: _____

Temperature: _____

Work volume (square feet of workplace surface per week): _____

Quantity of makeup solution added per week: _____

Quantity of chemicals added: _____

What chemicals are added?: _____

How much of the makeup volume is due to: _____

Replenishing dragout? _____

Replenishing evaporative losses? _____

Is deionized or reverse-osmosis filtered water used in the process baths? _____

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet 7 of 8 Page ____ of ____

WORKSHEET
7g

PROCESS INFORMATION

(continued)

3. METAL SURFACE TREATMENT AND PLATING OPERATIONS (continued)

Are dragout reduction techniques employed? _____

Which ones? _____

What is the dump schedule for the process tank? _____

Is the process line manual or automatic? _____

Is rack or barrel plating employed in the tank? _____

What is the production rate of the tank (in ft.² of workplace surface area per week)? _____

Are baths air sparged or mechanically agitated? _____

Are personnel trained to thoroughly drain workplaces above baths before moving them to another bath? _____ Are they periodically retrained? _____

Are there spaces between process baths and their rinse tanks that allow chemicals to drip on the floor? _____

Are process baths filtered to remove particulates? _____

4. PAINT APPLICATION

Which paint application techniques are employed at the plant?

		Volume of Work (ft ² of work surface coated per week)	Paint Composition (i.e., water based or solvent. Give solvent type. Are any lead-based paints used?)	Waste Generation Rate (Gal./Month)
Spray coating	<input type="checkbox"/>	_____	_____	_____
Dip coating	<input type="checkbox"/>	_____	_____	_____
Flow coating	<input type="checkbox"/>	_____	_____	_____
Roller coating	<input type="checkbox"/>	_____	_____	_____
Curtain coating	<input type="checkbox"/>	_____	_____	_____
Electro-coating	<input type="checkbox"/>	_____	_____	_____
Brush coating	<input type="checkbox"/>	_____	_____	_____
Powder coating	<input type="checkbox"/>	_____	_____	_____
Radiation curable coating	<input type="checkbox"/>	_____	_____	_____

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet <u>8</u> of <u>8</u> Page <u> </u> of <u> </u>

WORKSHEET
7h

PROCESS INFORMATION

(continued)

4. PAINT APPLICATION (continued)

Small part paint application:

Tumbling ☐ _____

Barrelling ☐ _____

Centrifuging ☐ _____

What size paint containers are purchased? _____

How is leftover paint waste in containers managed? _____

What measures are taken to control/manage overspray and drippings? _____

What temperatures are bake ovens run at? _____

5. MISCELLANEOUS

Are any metal oxide wastes generated in welding or soldering operations in your plant? _____

Note: If so, they must be managed as hazardous waste.

Are any hazardous fluxes used in welding or soldering operations? _____

How are the above wastes managed? _____

6. OTHER PROCESSES THAT GENERATE HAZARDOUS WASTE

<u>Process</u>	<u>Type of Waste</u>	<u>Annual Amount</u>	<u>Management Method</u>	<u>Annual Cost of Management</u>

Potential Source Reduction and Recycling Opportunities. _____

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet <u>1</u> of <u>4</u> Page <u> </u> of <u> </u>

WORKSHEET

13a

WASTE MINIMIZATION OPTIONS

Source reduction and recycling options for each metal fabrication industrial process are listed below (and discussed in detail earlier in this report). Select those that appear most promising for your plant, and enter these on Worksheet 13. Remember that source reduction options frequently offer both environmental and economic advantages over recycling.

PROCESS

Machining Operations

OPTIONS (Check those that appear promising for your plant.)

Source Reduction:

- Preventing Metal Working Fluid Contamination ☐
- Optimal Fluid Selection ☐
- Periodic or Continuous Filtration ☐
- Demineralized Water Use ☐
- Fluid Concentration Control ☐
- Material Substitution: Synthetic Fluids ☐
- Other _____ ☐

Recycling:

- Filtration ☐
- Skimming ☐
- Coalescing ☐
- Hydrocycloning ☐
- Centrifugation ☐
- Pasteurization ☐
- Downgrading and Reusing Fluids ☐
- Other _____ ☐

Metal Parts Cleaning and Stripping

Source Reduction:

- General Operating Procedures ☐
- Process Controls ☐
- Operator Training ☐
- Drainage Techniques ☐
- Storage and Distribution Measures ☐
- Other _____ ☐

Solvents

- Vapor Degreaser Use ☐
- Covered Immersion Tanks ☐
- Drainboard Installation ☐
- Other _____ ☐

Material Substitution

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet <u>3</u> of <u>4</u> Page ____ of ____

WORKSHEET
13c

WASTE MINIMIZATION OPTIONS

(continued)

Metal Surface Treatment and Plating

Source Reduction (continued):

Product Substitution

- Cadmium Plating Alternatives
- Chromium Plating Alternatives
- Cyanide Bath Alternatives
- Immiscible Rinses
- Other _____

Recycling:

- Process Bath Recycling ☐
- Rinsewater Recycling ☐
- Other _____ ☐

Paint Application

Source Reduction:

Process Modifications

- Reducing Empty Container Wastes ☐
- Reducing Overspray ☐
- Drip Reduction ☐
- Bake Oven Temperature Control ☐
- Equipment Maintenance ☐
- Other _____ ☐

Product Substitution Options

- Water Based Coatings ☐
- Radiations Curable Coating ☐
- Powder Coatings ☐
- Other _____ ☐

Recycling:

- Overspray ☐
- Container Wastes ☐
- Other _____ ☐

Other Processes

Plant _____	Waste Minimization Assessment	Prepared By _____
Date _____	Proj. No. _____	Checked By _____
		Sheet 4 of 4 Page ____ of ____

WORKSHEET
13d

WASTE MINIMIZATION OPTIONS

(continued)

Good Operating Practices

Material Handling Improvements

Waste Stream Segregation

Loss Prevention Practices

Preventive and Corrective Maintenance

Personnel Practices and Training

Management Initiatives

Employee Training

Employee Incentives

Procedural Measures

Documentation and Tracking

Storage

Other Good Operating Practices

